PROC. BIOL. SOC. WASH.
100(1), 1987, pp. 35–39

DROMIOPSIS KIMBERLYAE, A NEW LATE CRETACEOUS CRAB FROM THE PIERRE SHALE OF SOUTH DAKOTA

Gale A. Bishop

Abstract.—Two specimens of an undescribed Cretaceous crab were collected from the Heart Tail Ranch in the lower Pierre Shale, Butte County, South Dakota. The specimens are assigned to *Dromiopsis kimberlyae* n. sp., the second North American species of *Dromiopsis* and the first from the Cretaceous of North America. *Dromiopsis kimberlyae* joins seven previously described decapod taxa as a rare faunal element in the Heart Tail Ranch Decapod Assemblage.

Recollecting of the Heart Tail Ranch Decapod Assemblage, Butte County, South Dakota, on 23 June 1985, resulted in discovery of the left side of the carapace of an undescribed fossil crab (Fig. 2A, B) (by Kimberly Dawn Bishop). During subsequent collecting on 31 July 1985, I found a second specimen of this crab, a complete carapace with a partly extended abdomen (Fig. 2C–I). Both specimens are preserved in apatite concretions typical of the Heart Tail Ranch Decapod Assemblage (Bishop 1985). This assemblage now consists of eight decapod species represented by about 900 specimens. The Heart Tail Ranch Decapod Assemblage is from the Gammon Ferruginous Member of the Pierre Shale and is Early Campanian in age (see geologic map and stratigraphic diagrams in Bishop 1985, figs. 1 and 2).

Systematic Paleontology

Class Crustacea
Order Decapoda
Family Dynomenidae Ortmann, 1892
Dromiopsis Reuss, 1859

Diagnosis.—Carapace pentagonal, convex, front forming large triangular lobe, lateral margins tuberculate (to smooth), transverse grooves strong (emended after Glaessner 1969:R488).

Range.—*Dromiopsis* is Late Cretaceous to Paleocene in age, ranging from the Cenomanian through the Paleocene. Most taxa are from Belgium, Sweden, Denmark, and Germany (Förster 1975). One species, *Dromiopsis americana* Roberts, 1956, was described from the Paleocene of New Jersey.

Dromiopsis kimberlyae, new species
Figs. 1, 2

Diagnosis.—Carapace nearly circular, arched longitudinally and transversely; front downturned and triangular; anterolateral margin keeled, not tuberculate; transverse grooves strong, medial groove becoming obsolete posteriorly on intestinal region.

Types.—The holotype (SDSM 10184) and paratype (SDSM 10185) are deposited in the collections of the Museum of Geology, South Dakota School of Mines, Rapid City, South Dakota 57701.

Occurrence, preservation, and sample size.—Two specimens preserved in apatite concretions were collected in the SW ¼, Sec. 16, T11N, R2E, Butte County, South Dakota from the Heart Tail Ranch Assemblage (Bishop 1985). This fauna is from the zone of *Baculites* sp. (smooth), early form and is mid-early Campanian in age. The holotype is a complete carapace steinkern with a par-

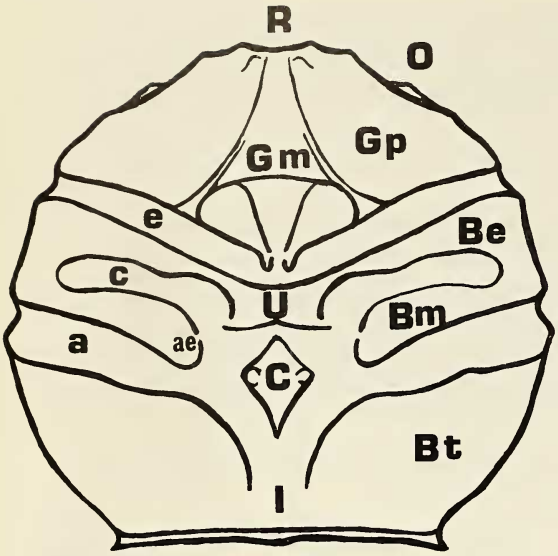

Fig. 1. Line drawings of carapace of *Dromiopsis kimberlyae* showing carapace regions and grooves. Carapace grooves are: e, cervical; c, postcervical; a, brachialcardiac, and ae, position of attachment of the *attractor epimeralis* muscle. Carapace regions are: R, rostrum; O, orbit; Gm, mesogastric; Gp, protogastric (with epigastric boss near rostrum); U, urogastric; C, cardiac; I, intestinal; and B, the branchial regions, Be, epibranchial, Bm, mesobranchial, and Bt, metabranchial.

tially extended, but reflexed, abdomen. The paratype is the left third of a carapace steinkern. *Dromiopsis kimberlyae* is the eighth decapod species to be described from the Heart Tail Ranch Assemblage and the specimens represent specimens number 855 and 856 collected from the Heart Tail Ranch.

Description.—Carapace pentagonal-circular, slightly wider than long (19.1 mm long, 19.8 mm wide), strongly arched transversely, arched longitudinally. Rostrum strongly downturned, triangular with medial sulcus running onto tip causing upturned rim to form a "bifid," blunt tip. Orbits large (59% of carapace width), divided, forming slight concavities on anterolateral margin, rims slightly raised, lower edge with suborbital spine. Anterolateral margins slightly concave around orbits then curving into a nearly circular arc, widest at crab's midpoint, then forming posterolateral margins until their junction with concave posterior margin. Anterolateral dorsal shield edge strongly reflexed and keeled from orbit to cervical furrow, from cervical furrow to branchiocardiac furrow, and for short distance immediately behind branchiocardiac furrow, breaking up into a few parallel elongate tubercles. Posterior margin raised into ridge bordered by marginal furrow. Carapace strongly differentiated by 3 more or less transverse grooves. Cervical groove deep, relatively straight and oblique. Branchiocardiac groove almost as deep, nearly transverse from dorsal shield edge to medial ridge where it bifurcates to encircle cardiac region. Between cervical and branchiocardiac furrows a shorter, third transverse groove, "post-cervical furrow," arising just anterior of cardiac region and running subparallel to other 2 transverse grooves, becoming obsolete before reaching dorsal shield edge. Cephalic arch (area anterior to cervical furrow) moderately differentiated into medial metagastric region, and protogastric-hepatic-epigastric region by indistinct groove running obliquely inward from cervical furrow then swinging forward to form triangular anterior tongue of mesogastric region. Posterior of mesogastric region separated into 2 low, lateral bosses by shallow medial furrow; each boss asymmetrical, steep behind where roughened by mold of muscle insertion areas terminating in pair of small, spinelike insertion points. Epigastric regions raised into small, circular, epigastric bosses. Scapular arch (area posterior to cervical groove) differentiated into sagittal ridge and branchial regions by more or less continuous longitudinal groove. Sagittal ridge consisting of (anterior to posterior) urogastric region ("Gastrical gruben" and urogastric regions of Förster 1975), diamond-shaped cardiac region with transversely-paired tubercles, and poorly differentiated intestinal region. Branchial regions subdivided into anterior epibranchial, me-

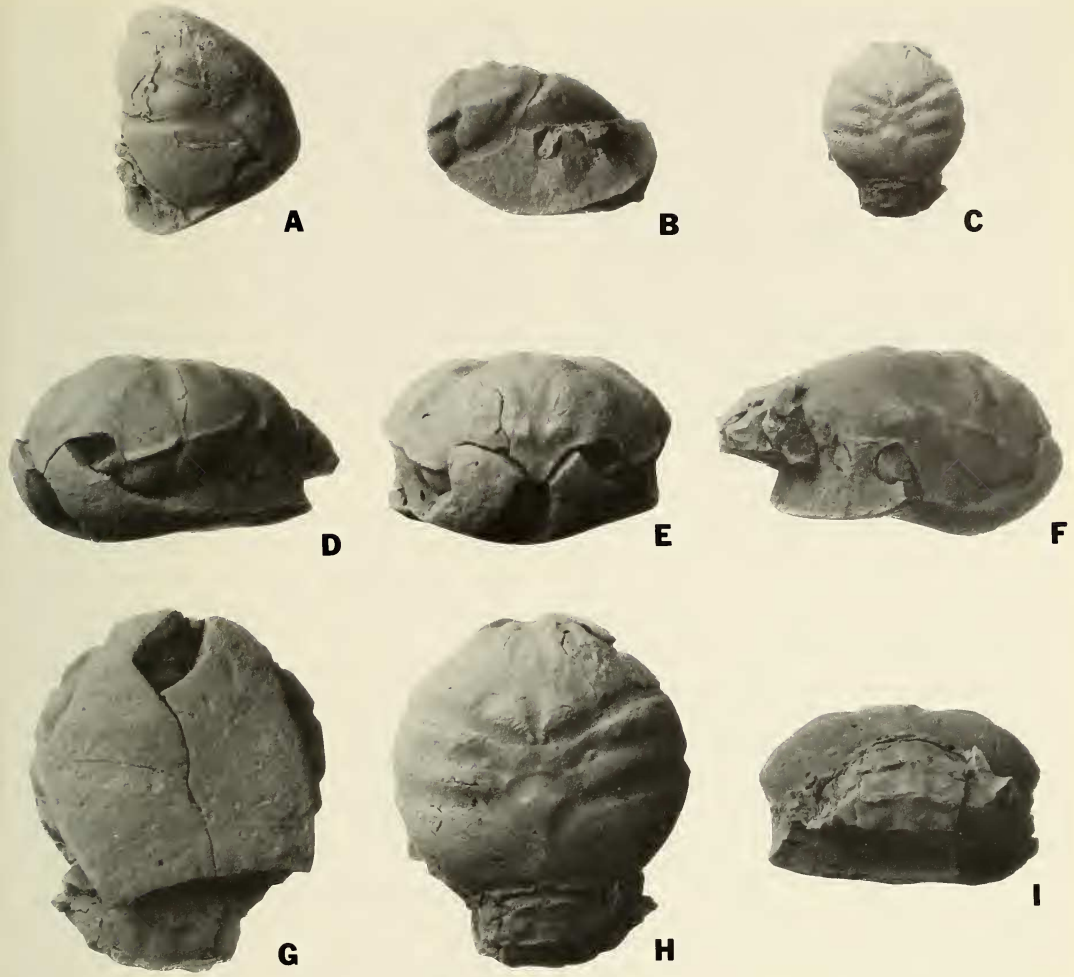

Fig. 2. Photographs of *Dromiopsis kimberlyae*: A–B, Dorsal and left lateral view of paratype (SDSM 10184), ×2.0; C–I, holotype specimen (SDSM 10185) seen in: C, Dorsal view, ×1.0; D, Left oblique; E, Anterior; F, Right lateral; G, Ventral; H, Dorsal; and I, Posterior views (D–I, ×2.0).

dial mesobranchial, and posterior metabranchial regions. Major muscle insertion points lie on posteriors of mesogastric bosses, on posterior edge of cervical furrow, and in small, paired oval areas in "postcervical furrow" (Fig. 2H). Both cervical and branchiocardiac furrow continue onto reflexed pterygostomial region separating it into an anterior part (subhepatic), medial part (anterior subbranchial), and posterior part (posterior subbranchial). Abdomen subtilely grooved longitudinally, with low, laterally placed pleural bosses paired across each somite. Appendages only preserved in cross section.

Etymology.—*Dromiopsis kimberlyae* is named in honor of its discoverer, Kimberly Dawn Bishop.

Comparison.—*Dromiopsis kimberlyae* can be distinguished from all congenors by its keeled, non-tuberculate anterolateral margin. *Dromiopsis kimberlyae* is much smoother, more circular, and has a carapace less divided by grooves than *D. rugosa*

(Schlotheim 1820) and its associates (*D.* cf. *rugosa* of Förster 1975). *Dromiopsis kimberlyae* is not as coarsely ornamented as is *D. gigas* Forir, 1887, nor does it have as prominent a transverse, raised urogastric region. *Dromiopsis kimberlyae* is more circular in dorsal view, has a proportionally broader posterior margin, less rounded anterolateral margins and much deeper carapace grooves than *D. elegans* Reuss, 1859. *Dromiopsis kimberlyae* is most similar to *D. laevior* Reuss, 1859, and the closely related (Förster 1975:290) form *D. depressa* Segerberg, 1900, in circular carapace shape, carapace proportions, and carapace smoothness. *Dromiopsis kimberlyae* differs from *D. depressa* by being much more circular, proportionally shorter, by having a much more highly grooved carapace, and by possessing a complete, incised cervical furrow. *Dromiopsis kimberlyae* is more circular than *D. laevior,* has deeper, more pronounced, more complete carapace grooves, retains a prominent, but incomplete, "postcervical" furrow where *D. laevior* does not, possesses tuberculate epigastric spines where *D. laevior* does not, and possesses transversely paired spinules on the cardiac region where *D. laevior* is smooth. *Dromiopsis kimberlyae* differs significantly from *D. americana* Roberts, 1956, by being more circular, having its carapace more fully differentiated by generally deeper, almost complete grooves (except perhaps the branchiocardiac furrow so prominently depicted by Roberts 1956: fig. 2), by possessing the keeled, rather than tuberculate, anterolateral margin, and by possessing the "postcervical" groove completely lacking in *D. americana. Dromiopsis pulchella* Secretan, 1964 (Pl. 19, fig. 7, text-figs. 99–100) bears little resemblance to congenors in *Dromiopsis* and may represent a new genus-level taxon.

Remarks.—*Dromiopsis kimberlyae* is the second species of *Dromiopsis* described from North America and is the only *Dromiopsis* from the Cretaceous of North America. Its scarcity in the Heart Tail Ranch Assemblage (~0.2% of the decapods) is in agreement with its European record (Förster 1975: 289) which consists of five species represented by approximately 12 specimens, many of which are only claws associated with fragmentary carapaces. *Dromiopsis kimberlyae* generally fits into the phyletic scheme envisioned by Roberts (1956:8), forcing the divergence of the *D. rugosa* stock from the *D. kimberlyae-D. elegans-D. laevior-D. americana* stock further back in time to at least the mid-early Campanian.

Acknowledgments

My thanks are extended to Chance and Cindy Davis for the western hospitality they have extended to me over the last decade of collecting on the Heart Tail Ranch. The original specimen of this new species was collected by my daughter, Kimberly Dawn, whose assistance is gratefully acknowledged. Indirect support for this research has been provided by NSF Grant 8011570, National Geographic Society Grants 1629 and 2867-84, and Georgia Southern College through its Faculty Research Committee. The manuscript was typed by Judith Underwood. The paper was strengthened by critical reading by R. M. Feldmann, Reinhard Förster, and an anonymous reviewer. Nelda Bishop proofread the typescript.

Literature Cited

Bishop, G. A. 1985. Fossil decapod crustaceans from the Gammon Ferruginous Member, Pierre Shale (Early Campanian), Black Hills, South Dakota.—Journal of Paleontology 59(3):605–624.

Forir, H. 1887. Contributions à l'étude du Système crétacé de la Belgique.—Annales de la Socieété Géologique de Belgique 14:25–26.

Förster, R. 1975. Ein Krebs aus dem oberen Campan von Misburg.—Berichte der Naturhistorischen Gesellschaft Hannover 119:285–294.

Glaessner, M. F. 1969. Decapoda. Pp. R399–R651 *in* R. C. Moore, ed., Treatise on Invertebrate Paleontology. Part R, Arthropoda 4, Vol. 2. University of Kansas Press and Geological Society of America, Lawrence, (Kansas).

Mertin, H. 1941. Decapode Krebse aus dem Subhercynen und Braunschweiger Emscher und Untersenon, sowie Bemerkungen uber einige verwandte Formen in der Oberkreide.—Nova Acta Leopoldina, Abhandlungen der Kaiserlich Leopoldinisch-Carolinisch Deutschen Akademie der Naturforscher 10(68):149–264.

Reuss, A. 1859. Zur Kenntnis fossiler Krabben.—Denkschriften der Kaiserlich Akademie der Wissenschaften in Wien 17:1–90.

Roberts, H. B. 1956. Early Tertiary decapod crustaceans from the Vincetown Formation in New Jersey.—Bulletin of the Wagner Free Institute of Science 31:5–12.

Schlotheim, E. F. v. 1820. Die Petrefactenkunde auf ihrem jetzigen Standpunkte durch die Beschreibung seiner Sammlung . . . erlautert. (Nachtrage, etc.) 3 Pt. Gotha, Becker. 62 + 437 pp. and atlas of plates.

Secretan, S. 1964. Les Crustacés Décapodes du Jurassique supérieur et du Crétacé de Madagascar.—Mémoires du Muséum National d'Histoire Naturelle, série C, 14:1–226.

Segerberg, K. O. 1900. De Anomura och Brachyura dekapoderna inom Skandinaviens yngre krita.—Geologiska Föreningens i Stockholm Förhandlingar 22(201):347–394.

Institute of Arthropodology and Parasitology, Department of Geology and Geography, Georgia Southern College, Statesboro, Georgia 30460-8149.